CLAIMS

What is claimed as being new and desired to be protected by LETTERS PATENT of the United States is as follows:

1. A pedestal system for supporting any of a plurality of objects at any of a plurality of angular orientations comprising, in combination:

a base having a lower vertical cylinder and an upper vertical cylinder with each cylinder having an interior surface and an exterior surface, the lower vertical cylinder being fixedly supported with respect to a recipient surface and the upper vertical cylinder being coupled to the base and rotatably supported with respect to the lower vertical cylinder, the upper and lower vertical cylinders sharing a common vertical axis;

the lower vertical cylinder housing a first bearing/motor/main-shaft subassembly coupling the upper and lower vertical cylinders of the base, the subassembly comprising a first hollow tubular main-shaft having an upper portion with an upper end and a lower portion with a lower end, the upper portion of the first main-shaft having a bearing seat with a lip with the upper portion of the first main-shaft being fixedly coupled to the upper vertical cylinder, the first main-shaft having a circumferential ring gear coupled thereto with the first main-shaft having an upper end bearing, the first main-shaft being coupled to the lower vertical cylinder by the bearing, the ring gear being below the bearing, the upper end bearing being a 4

point contact bearing, also known as an X bearing, the subassembly having at least one motor being coupled to the interior surface of the lower vertical cylinder, each motor having a drive shaft with a drive gear that engages the ring gear of the main-shaft thereby allowing rotation of the upper vertical cylinder with respect to the lower vertical cylinder;

a horizontal cylinder having an interior surface and an exterior surface, the horizontal cylinder having a second bearing/motor/main-shaft subassembly with the subassembly having a second hollow tubular main-shaft having an aperture there into, the second main-shaft having a right portion with a right end and a left portion with a left end, the right and left second main-shaft ends each having an end cap coupled thereto, with the left portion of the second main-shaft having a bearing seat with a lip, the subassembly having a left bearing and a right bearing, the left bearing being a 4 point contact bearing and the right bearing being a Conrad bearing, the second main-shaft having a circumferential ring gear coupled thereto, the subassembly having at least one motor being fixedly coupled to the interior surface of the upper vertical cylinder, each motor having a drive shaft with a drive gear that is engaged with the ring gear that allows the rotation of the horizontal cylinder shaft, with a position locator being from the class of position locators which includes resolvers and encoders being coupled to the shaft; and

a plurality of wires coupling each of the motors to a remote location for selectively energizing the horizontal motor and the base motor to selectively vary the angular orientation of the top-most horizontal shaft vertically and horizontally and an object supported within.

2. A pedestal system comprising, in combination:

a base having a lower vertical cylinder and an upper vertical cylinder with the cylinders being coupled to each other and sharing a common vertical axis;

the lower vertical cylinder housing a first bearing/motor/main-shaft subassembly, the first main-shaft having at least one bearing seat with a lip, the assembly having at least one bearing with the first main-shaft being coupled to the lower vertical cylinder by at least one bearing, the first main-shaft being fixedly coupled to the upper vertical cylinder, the subassembly having a drive means coupled to the lower vertical cylinder to provide rotation of the first main-shaft;

a horizontal cylinder having a second bearing/motor/main-shaft subassembly, the second main-shaft having a right end and a left end, the main-shaft having at least one bearing seat with a lip, the subassembly having at least one bearing, the subassembly having a drive means coupled to the upper vertical cylinder, the motor having a drive means to provide rotation of the second main-shaft; and

a plurality of wires coupling each of the drive means to allow a remote location for allowing the control of the drive means.

3. A Pedestal System as set forth in Claim 2 wherein the first bearing/motor/main-shaft subassembly couples the upper and lower vertical cylinders of the base, the subassembly comprising a first main-shaft having an upper portion with an upper end and a lower portion with a lower end, with the upper portion of the first main-shaft being fixedly coupled to the upper vertical cylinder, the upper portion of the first main-shaft having a bearing seat with a lip, the first main-shaft being coupled to the upper and lower cylinders of the base and having a circumferential ring gear coupled thereto with the first main-shaft having an upper bearing and a lower bearing, the upper bearing being located on the upper end of the main-shaft, the upper bearing being a 4 point contact bearing, also known as an X bearing, the lower bearing being located on the lower end of the main-shaft, the lower bearing being a Conrad bearing, the subassembly drive means being a motor being coupled to the lower vertical cylinder, the motor being a direct drive motor and coupled to the first main-shaft thereby allowing rotation of the upper vertical cylinder with respect to the lower vertical cylinder;

a hollow torque tube being coupled to the lower end of the first main-shaft, the torque tube allowing the coupling of a position determination device;

a horizontal cylinder having an interior surface and an exterior surface, the horizontal cylinder having a second bearing/motor/main-shaft subassembly with the subassembly having a second main-shaft with a right portion with a right end and a left portion with a left end, the right and left shaft ends each having an end cap coupled thereto, with the left portion and the right portion of the second main-shaft each having a bearing seat with a lip, the subassembly having a left bearing and a right bearing, the left bearing being located on the left end of the main-shaft, the left bearing being a 4 point contact bearing, also known as an X bearing, the right bearing being located on the right end of the main-shaft, the right bearing being a Conrad bearing, the subassembly having a direct drive motor being coupled to the upper vertical cylinder and to the second main-shaft thereby allowing rotation of the horizontal cylinder with respect to the upper vertical cylinder, with a position determination device being coupled to the second main-shaft; and,

a plurality of wires coupling each of the motors to a remote location for selectively energizing the horizontal motor and the base motor to selectively vary the angular orientation of the top-most horizontal shaft vertically and horizontally and an object supported within.

4. A Pedestal System as set forth in Claim 2 wherein the bearing coupled to the shaft is an X-bearing.

5. A Pedestal System as set forth in Claim 2 wherein the drive means is a motor/drive gear/reduction gear/worm gear combination.

6. A pedestal system for supporting any of a plurality of objects at any of a plurality of angular orientations comprising, in combination:

a base having a lower vertical cylinder and an upper vertical cylinder with each cylinder having an interior surface and an exterior surface, the lower vertical cylinder being fixedly supported with respect to a recipient surface and the upper vertical cylinder being coupled to the base and rotatably supported with respect to the lower vertical cylinder, the upper and lower vertical cylinders sharing a common vertical axis;

a first bearing/motor/main-shaft subassembly coupling the upper and lower vertical cylinders of the base, the subassembly comprising a first main-shaft having an upper portion with an upper end and a lower portion with a lower end, the upper portion of the first main-shaft having a bearing seat with a lip with the upper portion of the first main-shaft being fixedly coupled to the upper vertical cylinder, the first main-shaft having a circumferential ring gear coupled thereto with the first main-shaft having an upper end bearing, the ring gear being below the bearing, the upper end bearing being a 4 point contact bearing,

also known as an X bearing, the subassembly having at least one drive means being coupled to the interior surface of the lower vertical cylinder, each drive means being coupled to the ring gear of the main-shaft thereby allowing rotation of the upper vertical cylinder with respect to the lower vertical cylinder;

an intermediate cylinder, also known as a cross level cylinder, having a lower cross level cylinder and an upper cross level cylinder with each cylinder having an interior surface and an exterior surface and an upper end and a lower end, the lower end of the lower cross level cylinder being fixedly coupled to a link arm, the link arm having an upper end and a lower end, the lower end of the link arm being fixedly coupled at an acute angle to the upper vertical cylinder and the upper end of the link arm being fixedly coupled at an acute angle to the lower end of the lower cross level cylinder, the coupling thereby allowing an azimuth rotation of the arm, the upper cross level cylinder being coupled to the lower cross level cylinder and rotatably supported with respect to the lower cross level cylinder, the upper and lower cross level cylinders sharing a common axis;

a third bearing/motor/main-shaft subassembly housed within the lower cross level cylinder, the subassembly comprising a third main-shaft having an upper portion with an upper end and a lower portion with a lower end, the third main-shaft having at least one bearing seat with a lip with the upper portion of the lower cross level cylinder main-shaft being fixedly coupled to

the upper cross level cylinder, the third main-shaft having a circumferential ring gear coupled thereto with the third main-shaft having an upper end bearing, the ring gear being below the bearing, the upper end bearing being a 4 point contact bearing, also known as an X bearing, the subassembly having at least one drive means for providing rotation of the third main-shaft coupled to the interior surface of the lower cross level cylinder, each drive means coupled to the ring gear of the third main-shaft thereby allowing rotation of the upper cross level cylinder with respect to the lower cross level cylinder;

a horizontal cylinder having an interior surface and an exterior surface, the horizontal cylinder being fixedly coupled to the upper cross level cylinder having a second bearing/motor/main-shaft subassembly with the subassembly having a second main-shaft with a right portion with a right end and a left portion with a left end, the right and left main-shaft ends each having an end cap coupled thereto, with the main-shaft having at least one bearing lip, the subassembly having at least one bearing, the first bearing being a 4 point contact bearing, the second main-shaft having a circumferential ring gear coupled thereto, the subassembly having at least drive means being fixedly coupled to the interior surface of the upper cross level cylinder, each drive means being coupled to the ring gear and thereby allows the rotation of the horizontal cylinder shaft, with a position locator being from the class of position locators

which includes resolvers and encoders being coupled to the third main-shaft; and

a plurality of wires coupling each of the motors to a remote location for selectively energizing the horizontal motor and cross level and the base motor to selectively vary the angular orientation of the top-most horizontal shaft vertically and horizontally and an object supported thereto.

7. A pedestal system comprising, in combination:

a base having a lower vertical cylinder and an upper vertical cylinder with the cylinders being coupled to each other and sharing a common vertical axis;

the lower vertical cylinder housing a first bearing/motor/main-shaft subassembly, the first main-shaft having an upper end and a lower end and a bearing seat with a lip, the main-shaft being coupled to the lower vertical cylinder by at least one bearing, with the upper vertical cylinder being fixedly coupled to the upper end of the main shaft, the subassembly having a drive means to effectuate rotation of the main-shaft;

an arm link having an upper end and a lower end, the lower end fixedly coupled to the upper vertical cylinder;

a cross level cylinder having an upper cylinder and a lower cylinder, the lower cross cylinder fixedly coupled to the upper end of the arm link and housing a third bearing/motor/main-shaft subassembly, the third main-shaft having at least one bearing seat with a lip, the cross level third main-shaft being fixedly

coupled to the upper cross level cylinder and the third main-shaft being coupled to the lower cross level cylinder by at least one bearing, the subassembly motor having a drive means to effectuate rotation of the main-shaft;

a horizontal cylinder having a second bearing/motor/main-shaft subassembly, the second main-shaft having a right end and a left end, the second main-shaft having at least one bearing seat with a lip, the subassembly having at least one bearing, the subassembly having a drive means to provide rotation of the main-shaft; and

a plurality of wires coupling each of the drive means to a remote location for allowing the control of the drive means.

8. A Method for achieving bearing and rotational stiffness, comprising in combination:

providing a main-shaft having a first end and a second end and an associated gear, with the first end having at least one bearing seat;

providing at least one bearing, the bearing being an X bearing having a negative clearance, the X bearing coupled to the bearing seat of the main-shaft;

providing a drive means for rotating the shaft thereby allowing for a high rotational stiffness.

9. A Method for achieving bearing and rotational stiffness as described in Claim 8 wherein the system comprises two

bearings, one X bearing with a negative clearance and one Conrad bearing.

10. A Method for achieving bearing and rotational stiffness as described in Claim 8 wherein the system comprises direct drive motor coupled to the shaft.

11. A Method for achieving bearing and rotational stiffness as described in Claim 9 wherein the system comprises a shaft with a ring gear and a motor/drive gear/reduction gear/worm gear combination with the reduction gear/drive gear combination having a reduction rate of between about 2:1 and 5:1 thereby allowing the turning of the ring gear at a rate of between about 2 and 20 RPM with the worm gear/ring gear combination having a reduction rate of between about 100:1 and 400:1, the system having a high stiffness and the bearings having a high stiffness, providing for high rotational stiffness.

12. A Method for achieving bearing and rotational stiffness as described in Claim 11 wherein the system comprises a motor having a turning rate of between about 1000 and 8000 RPM.